

**MODUL  
PERKEMBANGAN PEMBELAJARAN  
SPM 2020**

**SKEMA  
MPP3**

**FIZIK**

**DISEDIAKAN OLEH PANEL AKRAM NEGERI TERENGGANU**

Tidak dibenarkan menyunting atau mencetak mana-mana bahagian dalam modul ini  
tanpa kebenaran Pengarah Pendidikan Negeri Terengganu

## Cadangan Jawapan

1	C	26	A
2	C	27	D
3	A	28	A
4	A	29	B
5	D	30	A
6	C	31	A
7	B	32	A
8	C	33	D
9	B	34	A
10	D	35	C
11	C	36	D
12	D	37	D
13	B	38	B
14	A	39	A
15	A	40	C
16	A	41	A
17	A	42	C
18	C	43	B
19	A	44	A
20	B	45	C
21	A	46	A
22	A	47	D
23	C	48	A
24	B	49	B
25	B	50	B

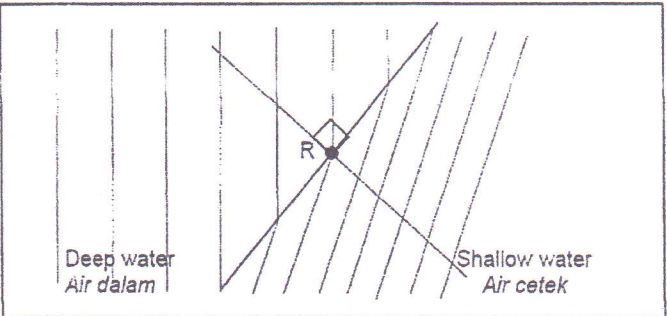
Cadangan Jawapan  
MPP3 KERTAS 2  
SPM 2020

Section A

Soalan 1

SOALAN 1	JAWAPAN	MARKAH	NOTA
(a)	Kadar perubahan sesaran	1	
(b) (i)	<input type="checkbox"/> The car moves with constant acceleration at PQ Kereta itu bergerak dengan pecutan seragam pada PQ	1	
	<input type="checkbox"/> / The car moves with zero acceleration at PQ Kereta itu bergerak dengan pecutan sifar pada PQ		
(ii)	Sesaran = $(\frac{1}{2} \times 4 \times 2) + (4 \times 2)$	1	
	= 12 m	1	
<b>JUMLAH</b>		<b>4</b>	

Soalan 2

SOALAN 2	JAWAPAN	MARKAH	NOTA	
(a)	Pembiasan gelombang	1		
(b)	Bertambah // tinggi // menumpu	1		
(c)	 <p>Deep water Air dalam</p> <p>Shallow water Air cetek</p>	1		
		(i) satu garis berserenjang pada titik R	1	
		(ii) <ul style="list-style-type: none"> <li>- garisan muka gelombang dengan panjang gelombang berkurang pada Kawasan cetek</li> <li>- Arah perambatan gelombang mendekati garis normal</li> </ul>	1	
<b>JUMLAH</b>		<b>5</b>		

## Soalan 3

SOALAN 3	JAWAPAN	MARKAH	NOTA
(a)	Jumlah haba bersih = 0J / dua jasad mempunyai suhu yang sama /	1	
(b)	45 °C	1	
(c) (i)	$Q = mc\theta$ $= 0.3(900)(100-45)$ $= 14850 \text{ J}$	1 1	
	$Q = mc\theta$ $14850 = 0.2(4200)(45 - x)$	1	
	27.32 °C	1	
(d)			
<b>JUMLAH</b>		<b>6</b>	

## Soalan 4

SOALAN 4	JAWAPAN	MARKAH	NOTA
(a)	The electric kettle will produce 2000J energy per second when connect with 240V.	1	
(b)	$P = IV$ $I = \frac{P}{V} = \frac{2000}{240}$ 8.33 A	1 1	
	(c)(i)	9 A	1
(c)(ii)	Fuse must be slightly more than the current flow through the kettle	1	
(d)	$V = IR$ $R = \frac{V}{I} = \frac{240}{8.33}$ 28.8 $\Omega$	1 1	
	<b>JUMLAH</b>	<b>7</b>	

## Soalan 5

SOALAN 5	JAWAPAN	MARKAH	NOTA
(a)	Pembengkokkan cahaya bila bergerak dalam medium berbeza ketumpatan dimana laju dan arah berubah	1	
(b)(i)	Laju cahaya dalam perspeks / Rajah 5.2 lebih tinggi	1	
(ii)	Indeks biasan perspek/ Rajah 5.2 lebih kecil	1	
(c)(i)	Semakin tinggi indeks biasan, semakin rendah laju cahaya	1	
(ii)	Semakin tinggi indeks biasan, semakin tinggi ketumpatan optikal	1	
(d)	Cahaya merambat dari air ke udara// Cahaya merambat dari ketumpatan tinggi ke rendah// laju cahaya tinggi ke laju rendah Dibiarkan menjauhi normal	1 1	
(e)	Kedalaman berkurang// lebih mendekati permukaan// atas imej duit syiling semasa dalam air	1	
<b>JUMLAH</b>		<b>8</b>	

## Soalan 6

SOALAN 6	JAWAPAN	MARKAH	NOTA
(a)	Arus yang dihasilkan menggunakan gerakan relatif di antara konduktor dan magnet.	1	
(b)(i)	Bilangan lilitan solenoid pada kedua-dua Rajah adalah sama.	1	
(b)(ii)	Kekuatan medan magnet pada Rajah 6.2 > Rajah 6.1.	1	
(b)(iii)	Magnitud arus aruhan pada Rajah 6.2 > Rajah 6.1.	1	
(c)(i)	Semakin bertambah kekuatan medan magnet, semakin bertambah magnitud arus aruhan yang dihasilkan.	1	
(c)(ii)	Hukum Faraday	1	
(d)	Tayar basikal berpusing, tombol memutar magnet, // Gerakan relatif berlaku antara gegelung dengan magnet kekal. Gegelung memotong fluks magnet. Arus aruhan dihasilkan untuk menyalakan mentol lampu depan basikal.	1 1 1	
<b>JUMLAH</b>		<b>8</b>	

## Soalan 7

SOALAN 7	JAWAPAN	MARKAH	NOTA
(a) (i)	Bahan/unsur konduksi antara konduktor dan penebat	1	
(ii)	Lapisan susutan		
(b)	- Diod sebagai injap arus // membenarkan arus mengalir dalam satu arah shj // a.t sahaja // separuh kitar pertama, arus mengalir positif, pincang kedepan Diod membenarkan arus mengalir pada separuh kitaran pertama sahaja // rektifikasi separuh gelombang // separuh kitar kedua, arus tidak mengalir, pincang songsang	1 1	
(c) (i)	- banyak // 4 diod - menghasilkan litar rektifikasi penuh gelombang	1 1	
(ii)	- dawai kuprum - rintangan rendah / arus tinggi	1 1	
(iii)	- kapasitor meratakan arus	1 1	
<b>JUMLAH</b>		<b>10</b>	

## Soalan 8

SOALAN 8	JAWAPAN	MARKAH	NOTA
(a)	Isotop yang mempunyai nukleus yang tidak stabil	1	
(b)	D Bacaan meter kadar paling tinggi	1 1	
(c)	100% → 50% → 25% → 12.5% → 6.25% 4 x 15 jam = 60 jam	1 1	
(d)(i)	Separuh hayat singkat  Dapat mengesan lokasi paip bocor dengan cepat// dapat memberi keputusan lebih cepat// bahan radioisotop tidak berada lama dalam saluran air// bahan radioisotop cepat hilang dari air	1  1	
(ii)	Kuasa menembusan sederhana  Boleh menembusi tanah tetapi tidak boleh menembusi paip// tidak membahayakan pekerja	1  1	
(iii)	Keadaan fizikal ialah pepejal dan larut air  Pepejal lebih mudah dikendalikan/ ia tidak tumpah//mudah mengair bersama aliran air	1  1	
(e)	Sodium – 24 // Natrium-24	1	
<b>JUMLAH</b>		<b>12</b>	

## Section B

## Soalan 9

SOALAN 9	JAWAPAN	MARKAH	NOTA														
(a)	Upwards force due to weight of water displaced	1															
(b)(i)	Weight of duck mother is greater // vice versa	1															
	Volume of water displaced by duck mother is greater// vice versa	2															
	Buoyant force of duck mother is greater// vice versa	3															
	Higher volume of water, higher buoyant force displaced	4															
	Higher buoyant force, higher weight of water displaced	5															
(ii)	Density of air in the balloon is lower	1															
	Weight of balloon is lower // reduce mass // reduce weight	2															
	Buoyant Force > weight	3															
	Resultant Force // net force	4															
(c)	<table border="1"> <thead> <tr> <th>Suggestion /Design/Way</th> <th>Explanation / Reason</th> </tr> </thead> <tbody> <tr> <td>Helium //Hydrogen/ H<sub>2</sub>//He</td> <td>Low density//light//buoyant force large than weight//increase net force</td> </tr> <tr> <td>Low density gas</td> <td>Light//buoyant force large than weight//increase net force</td> </tr> <tr> <td>Elastic//large stretch //strong material</td> <td>Withstand pressure// not burst//prevent explosion//lasting//durable</td> </tr> <tr> <td>Low density material</td> <td>Light//small mass</td> </tr> <tr> <td>(high) impermeability / ketelapan (High)water proof//air proof</td> <td>Gas not loss//diffusion prevented//does not absorb water//air cannot enter</td> </tr> <tr> <td>Nylon</td> <td>Elastic//light//strong//water @ air proof//tear resistance//strong</td> </tr> </tbody> </table>	Suggestion /Design/Way	Explanation / Reason	Helium //Hydrogen/ H <sub>2</sub> //He	Low density//light//buoyant force large than weight//increase net force	Low density gas	Light//buoyant force large than weight//increase net force	Elastic//large stretch //strong material	Withstand pressure// not burst//prevent explosion//lasting//durable	Low density material	Light//small mass	(high) impermeability / ketelapan (High)water proof//air proof	Gas not loss//diffusion prevented//does not absorb water//air cannot enter	Nylon	Elastic//light//strong//water @ air proof//tear resistance//strong	1, 2	
	Suggestion /Design/Way	Explanation / Reason															
	Helium //Hydrogen/ H <sub>2</sub> //He	Low density//light//buoyant force large than weight//increase net force															
	Low density gas	Light//buoyant force large than weight//increase net force															
	Elastic//large stretch //strong material	Withstand pressure// not burst//prevent explosion//lasting//durable															
	Low density material	Light//small mass															
	(high) impermeability / ketelapan (High)water proof//air proof	Gas not loss//diffusion prevented//does not absorb water//air cannot enter															
Nylon	Elastic//light//strong//water @ air proof//tear resistance//strong																
		3, 4															
		5, 6															
		7, 8															
		9, 10															
		11,12															



	Large size//Large balloon	Large volume of air displaced//large Buoyant Force//Increase buoyant force	13,14	
<b>JUMLAH</b>			<b>20</b>	

## Soalan 10

SOALAN 10	JAWAPAN	MARKAH	NOTA
(a)(i)	Frequency // Frekuensi	1	
(a)(ii)	Guitar string plucked on Diagram 10.1 is thicker than on Diagram 10.2.	1	
	The amplitude of traces on the C.R.O. screen on both diagrams is the same.	1	
	The frequency of traces on the C.R.O. screen on Diagram 10.2 is higher than on Diagram 10.1.	1	
	The thinner the guitar string, the higher the frequency of sound wave.	1	
	The higher the frequency, the higher the pitch of sound wave.	1	
(b)	Based on $v = f \lambda$ , as the speed of sound constant, the wavelength inversely proportional to the frequency.	1	
	High pitch sound: High frequency caused shorter wavelength.	1	
	The shorter the wavelength, the lesser wave diffracts / bending. (Only student C can hear the sound)	1	
	Low pitch sound: Low frequency caused longer wavelength.	1	
	The longer the wavelength, the more wave diffracts / bending. (All students, A, B and C can hear the sound)	1	
(c)	Suggestion	Explanation	
	Soft board to the wall.	Reduce reflection of sound wave // To absorb sound.	1,2
	Put carpets on the floor.	To absorb sound // Reduce reflection of sound wave.	3,4
	Longer distance of the loud speakers.	More loud sounds / constructive interference points produced // Distance x shorter.	5,6
	High position of the loud speakers.	No barrier / obstacle / blocking.	7,8
	Grooved surface of wall / acoustics wall // dinding berlekuk-lekuk	To reflects sound waves to the audiences widely.	9,10
<b>JUMLAH</b>		<b>20</b>	

## Section C

## Soalan 11

SOALAN 11	JAWAPAN	MARKAH	NOTA												
(a)	Keupayaan sesuatu bahan kembali ke bentuk / saiz asal apabila daya/mampatan/regangan dialihkan.	1													
(b)	-Terdapat daya tarikan dan daya tolakan. -Jika diregang, jarak antara molekul jauh -Daya tarikan antara molekul bertindak/bertambah -Jika pepejal dimampat, jarak antara molekul dekat -Daya tolakan antara molekul bertindak/bertambah	1 1 1 1 1	Max 4												
(c)(i)	$\frac{1}{2} (200)(0.1)^2$ =1 J  Tenaga Keupayaan kenyal = Tenaga kinetik // $\frac{1}{2} kx^2 = \frac{1}{2} mv^2$ $1 = \frac{1}{2} (0.01)v^2$ $v = 14.142 \text{ ms}^{-1}$	1 1  1 1 1													
(d)	<table border="1"> <thead> <tr> <th>Ciri</th> <th>Sebab</th> </tr> </thead> <tbody> <tr> <td>Jisim dart rendah</td> <td>Halaju tinggi</td> </tr> <tr> <td>Bentuk dart Aerodinamik</td> <td>Kurangkan geseran udara</td> </tr> <tr> <td>Ketebalan dawai spring tinggi</td> <td>Pemalar spring tinggi / Tenaga keupayaan elastik tinggi</td> </tr> <tr> <td>Diameter gegelung spring kecil</td> <td>Pemalar spring tinggi / Tenaga keupayaan elastik tinggi</td> </tr> <tr> <td>PILIH X</td> <td>Jisim rendah, bentuk aerodinamik, Ketebalan dawai spring tinggi, Diameter gegelung spring kecil</td> </tr> </tbody> </table>	Ciri	Sebab	Jisim dart rendah	Halaju tinggi	Bentuk dart Aerodinamik	Kurangkan geseran udara	Ketebalan dawai spring tinggi	Pemalar spring tinggi / Tenaga keupayaan elastik tinggi	Diameter gegelung spring kecil	Pemalar spring tinggi / Tenaga keupayaan elastik tinggi	PILIH X	Jisim rendah, bentuk aerodinamik, Ketebalan dawai spring tinggi, Diameter gegelung spring kecil	1,1 1,1 1,1 1,1 1,1	
Ciri	Sebab														
Jisim dart rendah	Halaju tinggi														
Bentuk dart Aerodinamik	Kurangkan geseran udara														
Ketebalan dawai spring tinggi	Pemalar spring tinggi / Tenaga keupayaan elastik tinggi														
Diameter gegelung spring kecil	Pemalar spring tinggi / Tenaga keupayaan elastik tinggi														
PILIH X	Jisim rendah, bentuk aerodinamik, Ketebalan dawai spring tinggi, Diameter gegelung spring kecil														
<b>JUMLAH</b>		<b>20</b>													

Soalan 12

SOALAN 12	JAWAPAN	MARKAH	NOTA														
(a)	Menaikkan atau menurunkan voltan output	1															
(b)	- Guna kabel tebal/ kuprum/aluminium	1															
	- Untuk mengurangkan rintangan	1															
	- Tinggikan voltan	1															
	- Mengurangkan arus	1															
(c)(i)	$P = 11\text{MW} = 11 \times 10^6 \text{ W}$ $I = P/V$	1	Markah penukaran imbuhan														
	$I = \frac{(11 \times 10^6)}{110 \times 10^3}$	1															
	$= 100 \text{ A}$	1															
(c)(ii)	$\Delta P = I^2 R$ $= 100^2 \times 50$ $= 5 \times 10^5 \text{ W}$	1															
		1															
(d)	<table border="1"> <thead> <tr> <th>CIRI-CIRI</th> <th>PENERANGAN</th> </tr> </thead> <tbody> <tr> <td>Magnet kekal berbentuk semibulatan</td> <td>To get a radial field. <i>Menghasilkan medan magnet jejarian</i></td> </tr> <tr> <td>Bilangan lilitan gegelung banyak</td> <td>More current flows and produces a larger force acting on the conductor// Increase the strength of electromagnet. <i>Lebih banyak arus mengalir dan menghasilkan daya lebih besar pada konduktor// Meningkatkan kekuatan elektromagnet</i></td> </tr> <tr> <td>Ketebalan magnet lebih besar</td> <td>To increase the strength of magnetic field. <i>Meningkatkan kekuatan medan magnet</i></td> </tr> <tr> <td>Bilangan bateri lebih banyak</td> <td>More current and the force on conductor increases. <i>Arus dan daya pada konduktor bertambah.</i></td> </tr> <tr> <td><b>PILIHAN</b></td> <td>R</td> </tr> <tr> <td><b>SEBAB PILIHAN</b></td> <td>Mempunyai magnet kekal berbentuk semibulatan, bilangan bilah kipas banyak, bilangan lilitan gegelung banyak dan bilangan bateri juga banyak.</td> </tr> </tbody> </table>	CIRI-CIRI	PENERANGAN	Magnet kekal berbentuk semibulatan	To get a radial field. <i>Menghasilkan medan magnet jejarian</i>	Bilangan lilitan gegelung banyak	More current flows and produces a larger force acting on the conductor// Increase the strength of electromagnet. <i>Lebih banyak arus mengalir dan menghasilkan daya lebih besar pada konduktor// Meningkatkan kekuatan elektromagnet</i>	Ketebalan magnet lebih besar	To increase the strength of magnetic field. <i>Meningkatkan kekuatan medan magnet</i>	Bilangan bateri lebih banyak	More current and the force on conductor increases. <i>Arus dan daya pada konduktor bertambah.</i>	<b>PILIHAN</b>	R	<b>SEBAB PILIHAN</b>	Mempunyai magnet kekal berbentuk semibulatan, bilangan bilah kipas banyak, bilangan lilitan gegelung banyak dan bilangan bateri juga banyak.	1, 1	
	CIRI-CIRI	PENERANGAN															
	Magnet kekal berbentuk semibulatan	To get a radial field. <i>Menghasilkan medan magnet jejarian</i>															
	Bilangan lilitan gegelung banyak	More current flows and produces a larger force acting on the conductor// Increase the strength of electromagnet. <i>Lebih banyak arus mengalir dan menghasilkan daya lebih besar pada konduktor// Meningkatkan kekuatan elektromagnet</i>															
	Ketebalan magnet lebih besar	To increase the strength of magnetic field. <i>Meningkatkan kekuatan medan magnet</i>															
	Bilangan bateri lebih banyak	More current and the force on conductor increases. <i>Arus dan daya pada konduktor bertambah.</i>															
	<b>PILIHAN</b>	R															
	<b>SEBAB PILIHAN</b>	Mempunyai magnet kekal berbentuk semibulatan, bilangan bilah kipas banyak, bilangan lilitan gegelung banyak dan bilangan bateri juga banyak.															
		1, 1															
		1, 1															
		1, 1															
		1															
		1															
		20															
<b>JUMLAH</b>																	

## SECTION A

1	(a) (i)	Refractive index, $n$	1																							
	(ii)	Refracted angle / $r$	1																							
	(iii)	Incident angle/ $i$	1																							
		-all the value of $r$ are correct -all the value of $\sin r$ are correct -all the value of $\frac{1}{\sin r}$ are correct	3																							
(b)	<table border="1" data-bbox="528 808 1123 1039"> <thead> <tr> <th><math>n</math></th> <th><math>r / ^\circ</math></th> <th><math>\sin r</math></th> <th><math>\frac{1}{\sin r}</math></th> </tr> </thead> <tbody> <tr> <td>1.47</td> <td>19</td> <td>0.3256</td> <td>3.07</td> </tr> <tr> <td>1.92</td> <td>15</td> <td>0.2588</td> <td>3.86</td> </tr> <tr> <td>2.42</td> <td>12</td> <td>0.2079</td> <td>4.81</td> </tr> <tr> <td>2.91</td> <td>10</td> <td>0.1736</td> <td>5.76</td> </tr> <tr> <td>3.50</td> <td>8</td> <td>0.1392</td> <td>7.19</td> </tr> </tbody> </table> <p>1. Columns <math>n</math>, <math>r</math>, <math>\sin r</math>, <math>\frac{1}{\sin r}</math></p> <p>2. All the units of <math>n</math>, <math>r</math>, <math>\sin r</math>, <math>\frac{1}{\sin r}</math> are correct</p> <p>3. All the value from (b) transferred to the table are correct and consistent</p> <p>4. Value of <math>r</math> without decimal place  <math>\sin r</math>, constant at 3 @ 4 decimal places  <math>\frac{1}{\sin r}</math> constant at 2 decimal places</p>	$n$	$r / ^\circ$	$\sin r$	$\frac{1}{\sin r}$	1.47	19	0.3256	3.07	1.92	15	0.2588	3.86	2.42	12	0.2079	4.81	2.91	10	0.1736	5.76	3.50	8	0.1392	7.19	4
$n$	$r / ^\circ$	$\sin r$	$\frac{1}{\sin r}$																							
1.47	19	0.3256	3.07																							
1.92	15	0.2588	3.86																							
2.42	12	0.2079	4.81																							
2.91	10	0.1736	5.76																							
3.50	8	0.1392	7.19																							

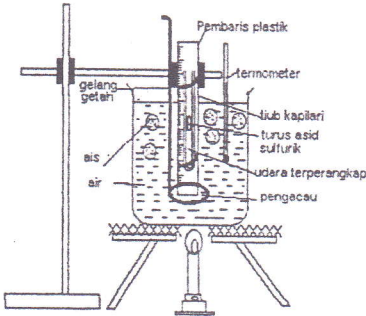
	<p>(c) <b>Able to draw a complete graph of <math>n</math> against <math>\frac{1}{\sin r}</math></b>          Tick <math>\checkmark</math> based on the following aspects:</p> <ul style="list-style-type: none"> <li>-shown on Y-axis and <math>\frac{1}{\sin r}</math> on the X-axis</li> <li>-no unit of both axis</li> <li>-both axes are marked with uniform scale</li> <li>-all five points are plotted correctly</li> </ul> <p>[Note: 3 to 4 points plotted correctly: <math>\checkmark</math>]</p> <ul style="list-style-type: none"> <li>-best straight line is drawn</li> <li>-show the minimum size of graph at least 10cm (y-axis) x 8 cm ( x-axis)          (counted from the origin until furthest point)</li> </ul> <p><u>Score :</u></p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Number of <math>\checkmark</math></th> <th>Score</th> </tr> </thead> <tbody> <tr> <td>7 <math>\checkmark</math></td> <td>5</td> </tr> <tr> <td>5-6 <math>\checkmark</math></td> <td>4</td> </tr> <tr> <td>3-4 <math>\checkmark</math></td> <td>3</td> </tr> <tr> <td>2 <math>\checkmark</math></td> <td>2</td> </tr> <tr> <td>1 <math>\checkmark</math></td> <td>1</td> </tr> </tbody> </table>	Number of $\checkmark$	Score	7 $\checkmark$	5	5-6 $\checkmark$	4	3-4 $\checkmark$	3	2 $\checkmark$	2	1 $\checkmark$	1	5
Number of $\checkmark$	Score													
7 $\checkmark$	5													
5-6 $\checkmark$	4													
3-4 $\checkmark$	3													
2 $\checkmark$	2													
1 $\checkmark$	1													
	<p>(d) Directly proportional</p> <ul style="list-style-type: none"> <li>• Refer to the graph plotted by student</li> </ul>	1												
	<b>Total</b>	<b>16</b>												

## Question 2

Section	Mark	Mark scheme
2 (a)	(i)	1 x directly proportional to $\lambda$
	(ii)	1 1 1 Show graphical extrapolation correctly State the value of x x = 4.76mm
	(ii)	1 1 1 Draw a sufficiently large triangle, at least (8x8)cm Correct substitution (follow candidate's triangle)  eg: $k = \frac{4.4-0}{0.0006-0}$  k = 7333.33
(b)	1  1	$a = \frac{4m}{7333.33}$  a = $5.45 \times 10^{-4}m$  *accept in range : $(5.45 - 5.48) \times 10^{-4}m$
(c)(i)	1	decreases
(ii)	1	x directly proportional to D
(d)	1	The position of eye must be perpendicular to the scale of metre rule to avoid parallax error. The experiment is carry out in the dark room. (any one relevant response)
Total	12	

## SECTION B

Question 3		
Mark	Section	Answer
1 <sup>st</sup>	3 (a)	<b><u>State a suitable inference</u></b> The temperature affects the volume
1 <sup>st</sup>	(b)	<b><u>State relevant hypothesis (with direction)</u></b> as the temperature increase, the volume increase.
1	(c)	<b>Describe a complete and suitable experimental framework</b>
1 <sup>st</sup>		<b><u>State the aim of the experiment</u></b> To investigate the relationship between the temperature of air and the volume.
2 <sup>nd</sup>		<b><u>State the manipulated variable and the responding variable</u></b> Manipulated variable : temperature Responding variable : volume/ length of air trapped, $l$
3 <sup>rd</sup>		<b><u>State the constant variable</u></b> Constant variable : pressure // mass of air
4 <sup>th</sup>		<b><u>List out the important apparatus and materials</u></b> beaker, Bunsen burner, retort stand, capillary tube, meter ruler, thermometer, rubber band, stirrer, water, sulfuric acid and ice.

<p>5<sup>th</sup></p>		<p><b><u>State a function arrangement of the apparatus</u></b>                  A manometer is connected to thistle funnel with rubber tube</p> 														
<p>6<sup>th</sup></p>		<p><b><u>State the method of controlling the manipulated variable</u></b>                  Heat the water in the beaker and then ice is placed into the water until temperature is 30 °C.</p>														
<p>7<sup>th</sup></p>		<p><b><u>State the method of measuring the responding variable</u></b>                  Measure and record the length of air trapped in capillary tube, <math>l</math></p>														
<p>8<sup>th</sup></p>		<p><b><u>Repeat the experiment at least 4 times with different values</u></b>                  Repeat the previous steps using 4 different temperature, <math>\theta = 40\text{ }^\circ\text{C}</math>, <math>50\text{ }^\circ\text{C}</math>, <math>60\text{ }^\circ\text{C}</math> and <math>70\text{ }^\circ\text{C}</math>.</p>														
<p>9<sup>th</sup></p>		<table border="1" data-bbox="405 1330 1158 1420"> <tr> <td><math>\theta / ^\circ\text{C}</math></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td><math>l / \text{cm}</math></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>	$\theta / ^\circ\text{C}$							$l / \text{cm}$						
$\theta / ^\circ\text{C}$																
$l / \text{cm}$																
<p>10<sup>th</sup></p>		<p><b><u>State how data will be analysed (sketch graph/statement)</u></b>                  Plot graph volume, <math>L</math> against temperature</p>														
<p>Total</p>	<p>12</p>															



Question 4

Section	Mark	Mark Scheme
4 (a)	1	<p>State a suitable inference</p> <ul style="list-style-type: none"> <li>• Arus mempengaruhi daya yang bertindak ke atas konduktor</li> </ul>
4 (b)	1	<p>State a relevant hypothesis</p> <ul style="list-style-type: none"> <li>• Semakin bertambah arus elektrik, semakin bertambah jarak konduktor bergerak.</li> </ul>
4(c)		Describe a complete and suitable experimental framework
(i)	1	<p>State the aim of the experiment</p> <p>Mengkaji hubungan antara arus elektrik dan jarak konduktor bergerak.</p>
(ii)	1 1 1	<p>State the manipulated variable and the responding variable</p> <p>Manipulated variable : Arus elektrik, I</p> <p>Responding variable : Jarak konduktor tersesar, s</p> <p>State the constant variable</p> <p>Constant variable : Jisim konduktor//panjang konduktor</p>
(iii)	1	<p>List out the important apparatus and materials</p> <p>Rod kuprum nipis (konduktor) , bekalan kuasa a.t, 2 magnet bar, dening besi, dawai penyambung, reostat, ammeter, 2 rod kuprum tebal (landasan), dan pembaris.</p>
(iv)	1	<p>State a functionable arrangement of the apparatus</p>

(v)	1	<p><u>State the method of controlling the manipulated variable</u></p> <p>Susun radas seperti dalam rajah dan suis dihidupkan dan laraskan arus supaya bacaan ammeter adalah 1.0A.</p>												
(vi)	1	<p><u>State the method of measuring the responding variable</u></p> <p>Matikan suis dan letak semula konduktor di antara dua magnet. Suis dihidupkan dan biarkan konduktor bergerak di atas landasan rod kuprum tebal sehingga berhenti. Matikan suis, kemudian ukur jarak konduktor yang telah tersesar dengan menggunakan pembaris.</p>												
(vii)	1	<p><u>Repeat the experiment at least four times</u></p> <p>Ulang langkah bagi arus elektrik 2.0A, 3.0A, 4.0A dan 5.0A.</p>												
(viii)	1	<p><u>Tabulate the data</u></p> <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th>Arus, I (A)</th> <th>Jarak konduktor bergerak, s (cm)</th> </tr> </thead> <tbody> <tr> <td>1.0</td> <td></td> </tr> <tr> <td>2.0</td> <td></td> </tr> <tr> <td>3.0</td> <td></td> </tr> <tr> <td>4.0</td> <td></td> </tr> <tr> <td>5.0</td> <td></td> </tr> </tbody> </table>	Arus, I (A)	Jarak konduktor bergerak, s (cm)	1.0		2.0		3.0		4.0		5.0	
Arus, I (A)	Jarak konduktor bergerak, s (cm)													
1.0														
2.0														
3.0														
4.0														
5.0														
(ix)	1	<p><u>State how the data is analysed</u></p> <p>Plot graf s melawan I</p>												
<b>TOTAL</b>	<b>12</b>													